

IN THE CLAIMS:

Please cancel claims 28-32 without prejudice or disclaimer.

In accordance with 37 C.F.R. § 1.121(c)(1), please substitute for the pending claims the following rewritten version of the same claims, as amended. Claim 34 is amended. The changes are shown explicitly in the attached "Version with Markings to Show Changes Made."

1. A loudspeaker comprising a resonant panel-form member and a vibration exciting system on the panel-form member and adapted to apply bending wave energy thereto to cause the panel-form member to produce an acoustic output, wherein the vibration exciting system is adapted to apply torsion to the panel-form member.

3. A loudspeaker according to claim 34, wherein the vibration exciting system is adapted to apply shear to the panel-form member.

5. A loudspeaker according to claim 1, wherein the vibration exciting system comprises a suspension on which the panel-form member is mounted, the suspension acting as a pivot about which at least a portion of an edge of the panel-form member local to the vibration exciting system can hinge.

6. A loudspeaker according to claim 5, wherein the suspension is of a plastics foam of high shear stiffness.

7. A loudspeaker according to claim 34, wherein the vibration exciting system comprises a piezoelectric device attached to the panel-form member to apply a bending couple thereto by introducing alternating tension and compression to the panel-form member in the plane thereof.

8. A loudspeaker according to claim 7, wherein the piezoelectric device is attached to a face of the panel-form member.

9. A loudspeaker according to claim 8, comprising mirror-image piezoelectric devices attached to opposite faces of the panel-form member.

10. A loudspeaker according to claim 7, wherein the piezoelectric device has a portion disposed adjacent to the suspension, and a portion disposed remotely from the suspension.

11. A loudspeaker according to claim 7, wherein the piezoelectric device is a thin strip-like device fixed to the panel-form member by adhesive.

12. A loudspeaker according to claim 7, wherein the piezoelectric device is a unimorph device.

13. A loudspeaker according to claim 12, wherein the unimorph device comprises opposed parts arranged such that one part increases in length while the other part contracts.

14. A loudspeaker according to claim 34 or claim 7, wherein the panel-form member is transparent.

15. A loudspeaker according to claim 14, wherein the piezoelectric device is transparent.

16. A loudspeaker according to claim 7, wherein the piezoelectric device is of PZT.

17. A loudspeaker according to claim 34, wherein the vibration exciting system comprises an inertial device.

18. A loudspeaker according to claim 17, wherein the inertial device comprises an inertial mass rigidly fixed to the panel-form member to form a suspension pivot.

19. A loudspeaker according to claim 17, wherein the inertial device is an inertial vibration exciter.

20. A loudspeaker according to claim 19, comprising opposed inertial vibration excitors on opposite sides of the panel-form member.

21. A loudspeaker according to claim 19, comprising an additional inertial vibration exciter on the panel-form member and coupled to the first said inertial vibration exciter in anti-phase to damp unwanted whole body movement of the panel-form member.

22. A loudspeaker according to claim 1 or claim 5, wherein the vibration exciting system comprises an electrodynamic motor having a rotor with a current-carrying conductor array fixed to the panel-form member with its axis parallel to the plane of the member to apply torsion thereto, and a magnet forming a magnetic field in which the rotor is positioned.

23. A loudspeaker according to claim 1 or claim 5, wherein the vibration exciting system comprises a bimorph piezoelectric device which is generally rectangular and orientated diagonally to act as a twister.

24. A loudspeaker according to claim 1 or claim 5, wherein the vibration exciting system comprises an element rigidly coupled to and projecting away from the panel-form member, and an exciter which induces bending moments in the element.

25. A loudspeaker according to claim 24, wherein the element is generally perpendicular to the panel-form member, bending moments are produced by displacement in a part of the element spaced from the panel-form member, and the displacement is generally perpendicular to the element.

26. A loudspeaker according to claim 25, wherein the displacement is effected using a piezoelectric device.

27. A loudspeaker according to claim 25, wherein the displacement is effected by an inertial device.

33. A loudspeaker according to claim 1, wherein the vibration exciter is coupled to the panel-form member to span a plurality of nodal lines in the panel-form member.

34. (Amended) A loudspeaker comprising:
a panel-form member mounted on a suspension; and
a vibration exciting system mounted on the panel-form member;
the vibration exciter being adapted to apply bending wave energy to the panel-form member and cause resonance, thereby producing an acoustic output;
wherein the suspension acts as a pivot, thereby supporting the panel-form member in a simple fashion and causing nodal lines corresponding to the resonance of the panel-form member to move towards an edge of the member as compared to a generally corresponding but resiliently or freely edge-suspended panel-form member;
the vibration exciter being positioned so as to bridge across several of said nodal lines.

35. A loudspeaker according to claim 34, wherein said suspension comprises a high shear stiffness material.

36. A loudspeaker according to claim 35, wherein said suspension comprises high shear stiffness foam plastics material.

37. A loudspeaker according to claim 34, claim 35 or claim 36, wherein the suspension acts as a pivot only in the region local to the exciter.

38. A loudspeaker according to claim 37, wherein the suspension in regions other than the region local to the exciter is resilient.

39. A loudspeaker according to claim 38, wherein the suspension in regions other than the region local to the exciter is soft foam material.